Chapter 3: Status and Recovery of ESA-Listed Salmon and Steelhead

A high priority of the PCSRF program is funding ESA recovery and restoration of 16 salmon Evolutionarily Significant Units (ESUs) and 10 steelhead Distinct Population Segments (DPSs). These ESUs and DPSs are grouped into seven recovery domains. Additionally, one previously listed population is tracked in a Restoration Area (see inside back cover). Recovery domains provide the means to consider ecosystems as a component of salmon recovery. The listed salmon and steelhead ESUs/DPSs require investment of multiple resources to reach self-sustaining and genetically diverse levels. The PCSRF provides resources for habitat restoration and protection that can assist in sustaining the species when external conditions produce high and low population cycles. The distribution of salmon ESUs and steelhead DPSs in the Pacific Coast region is displayed in Exhibit 3-1.

Fish Abundance and Major Factors Limiting Recovery

This chapter presents information on abundance and factors limiting recovery of salmon and steelhead by recovery domain. Graphics on the following pages show estimates of adult returns (including percentages of wild and hatchery fish where known) and the historical population size. Tables for each recovery domain list major limiting factors that represent a set of conditions that have been identified as inhibiting recovery; ESA-listed salmon and steelhead are not likely to recover if the major limiting factors are not addressed. The limiting factors are defined in the Framework (see http://www.nwr.noaa.gov/Salmon-Recovery-Planning/PCSRF/upload/PCSRF-Perf-Framework.pdf). For each recovery domain, the PCSRF activities that address the limiting factors are identified. The habitat factors that the PCSRF addresses tend to be linked and efforts to improve habitat are often cumulative, meaning that as each limiting factor is addressed, the habitat value for salmon increases.

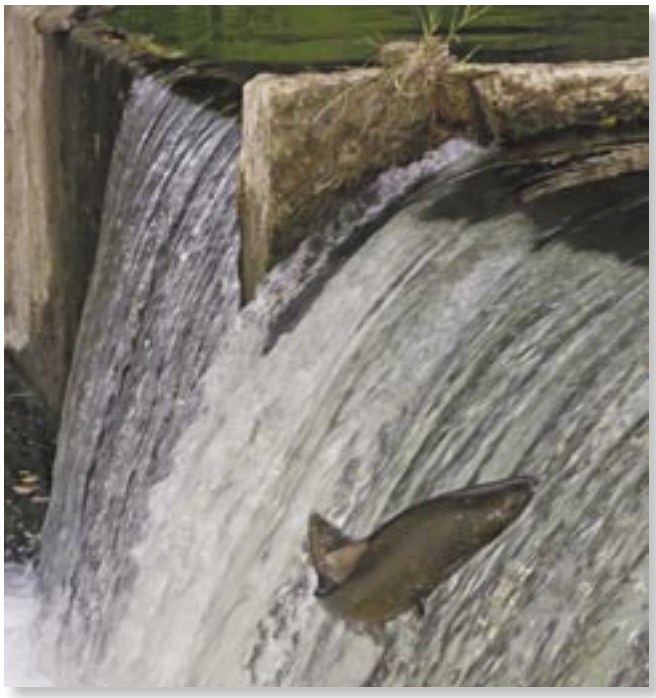
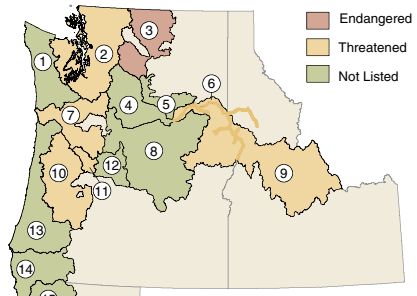


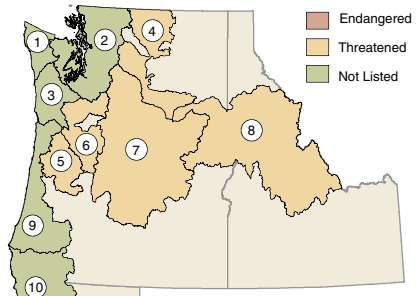
Exhibit 3-1: Distribution of Salmon ESUs and Steelhead DPSs

Chinook



1 Washington Coast
2 Puget Sound
3 Upper Columbia River Spring (E) and Upper Columbia River Summer/Fall (N)
4 Upper Columbia River Summer/Fall and Middle Columbia River Spring
5 Upper Columbia River Summer/Fall
6 Snake River Fall
7 Lower Columbia River
8 Middle Columbia River Spring
9 Snake River Spring/Summer
10 Upper Willamette River
11 Lower Columbia River and Upper Willamette River
12 Deschutes River Summer/Fall
13 Oregon Coast
14 Southern Oregon and Northern California Coastal
15 Upper Klamath-Trinity Rivers
16 California Coastral
17 Sacramento River Winter (E) and Central Valley Spring (T) and Central Valley Fall and Late Fall (N)
18 Central Valley Fall and Late Fall

Steelhead

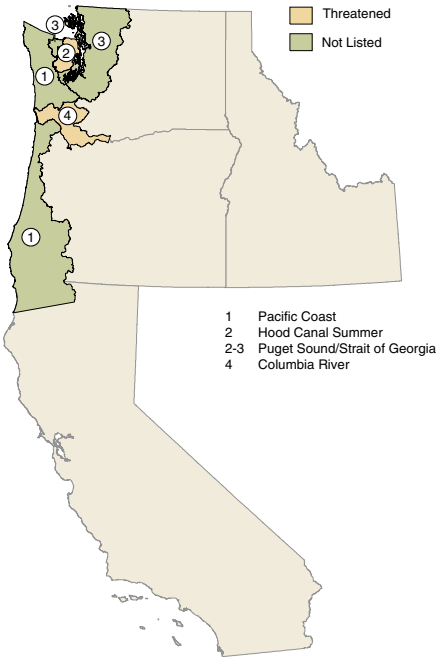


1 Olympic Peninsula
2 Puget Sound
3 Southwest Washington
4 Upper Columbia River
5 Upper Willamette River
6 Lower Columbia River
7 Middle Columbia River
8 Snake River Basin
9 Oregon Coast
10 Klamath Mountains Province
11 Northern California
12 Central Valley
13 Central California Coast
14 South Central California Coast
15 Southern California Coast

Sockeye

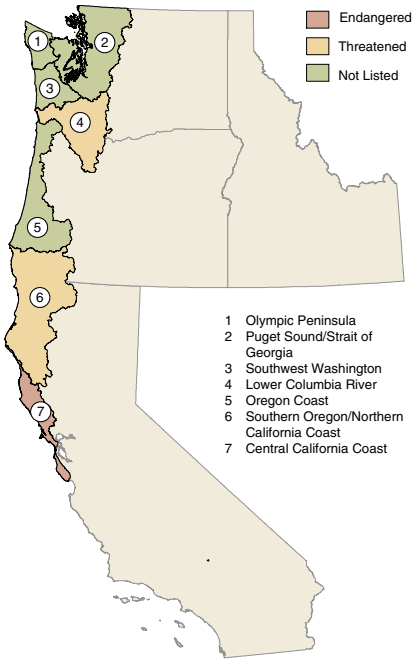
1 Ozette Lake
2 Lake Pleasant
3 Quinault Lake
4 Baker River
5 Okanogan River
6 Lake Wenatchee
7 Snake River

Chum



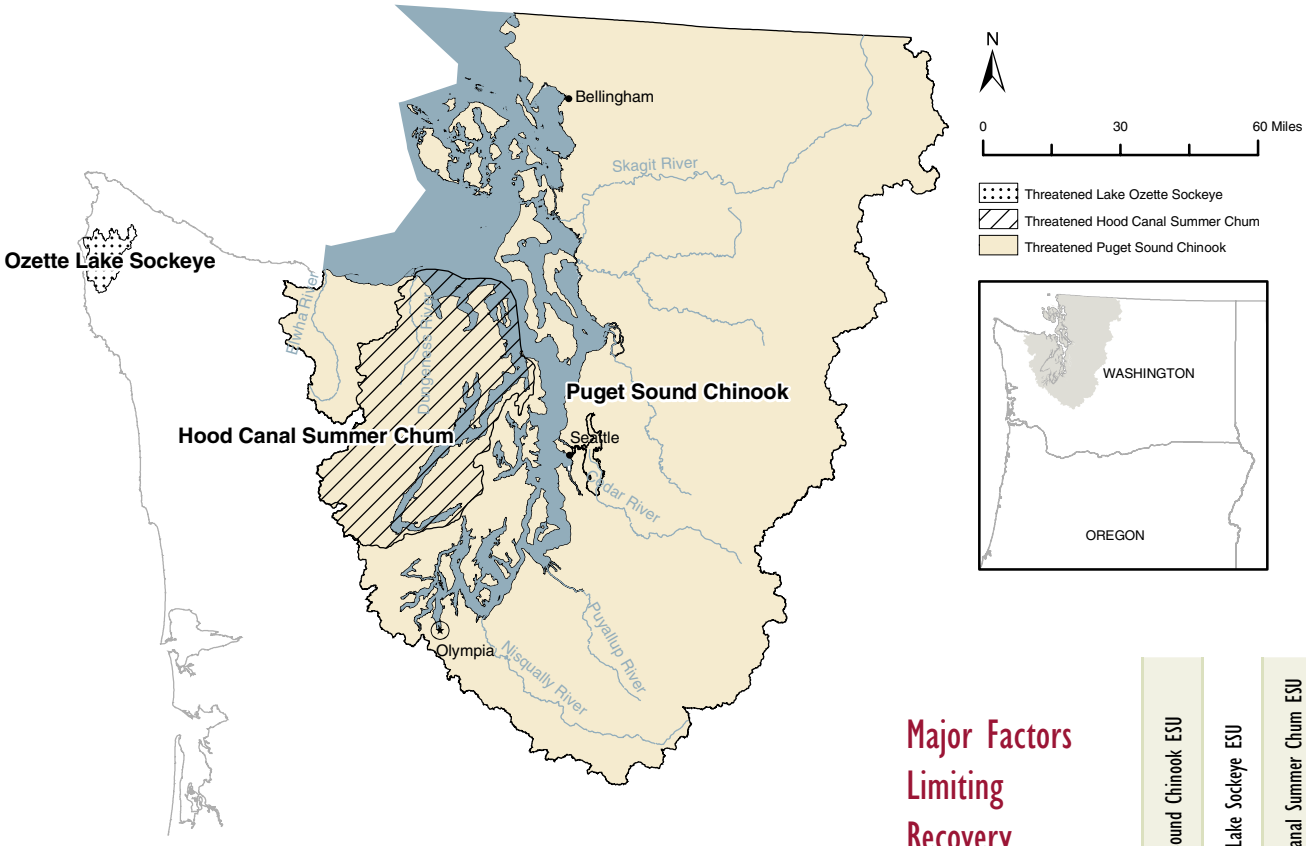
1 Pacific Coast
2 Hood Canal Summer
2-3 Puget Sound/Strait of Georgia
4 Columbia River

Coho



1 Olympic Peninsula
2 Puget Sound/Strait of Georgia
3 Southwest Washington
4 Lower Columbia River
5 Oregon Coast
6 Southern Oregon/Northern California Coast
7 Central California Coast

Exhibit 3-2: Puget Sound Recovery Domain

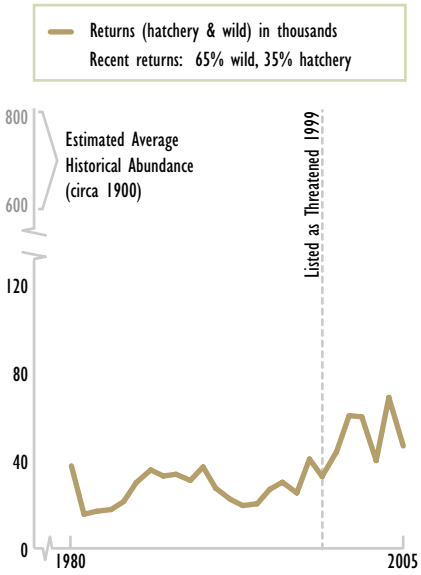


PCSRF Activities in the Recovery Domain

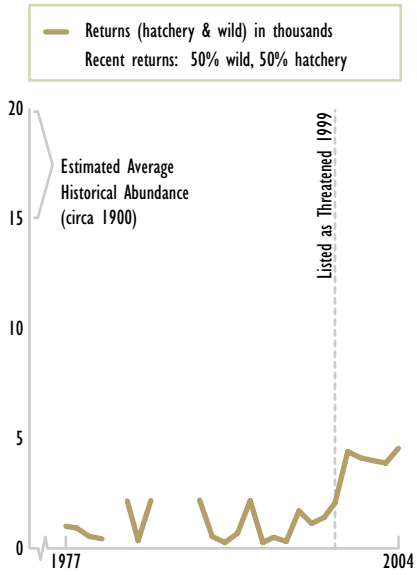
- Restored 87 stream miles and stabilized 15 stream miles of instream habitat
- Returned 12 cubic feet per second of water for instream flow
- Restored 92 acres of upland habitat and reduced impacts from 229 miles of road
- Restored 1,249 acres and 148 stream miles of riparian habitat
- Restored 114 acres and created 43 acres of wetland habitat
- Restored 1,935 acres and created 1,106 acres of estuarine habitat
- Protected 7,552 acres and 82 stream miles of habitat through land acquisition, easement, or lease
- Treated 497 acres of riparian habitat for invasive species
- Treated 9 acres of wetland habitat for invasive species
- Treated 1,060 acres of estuarine habitat for invasive species
- Removed 85 barriers to fish passage, opening 197 stream miles
- Installed 2 fish screens

Major Factors Limiting Recovery	Puget Sound Chinook ESU	Ozette Lake Sockeye ESU	Hood Canal Summer Chum ESU
Degraded Habitat–Estuarine and Nearshore Marine	●		●
Degraded Habitat–Floodplain Connectivity and Function	●	●	●
Degraded Habitat–Channel Structure and Complexity	●	●	●
Degraded Habitat–Riparian Areas and Large Woody Debris Recruitment	●	●	●
Degraded Habitat–Stream Substrate	●	●	●
Degraded Habitat–Stream Flow			●
Degraded Habitat–Water Quality	●		
Degraded Habitat–Fish Passage			
Hatchery-related Adverse Effects			
Harvest-related Adverse Effects			
Predation/Competition/Disease		●	
PCSRF Projects Addressing Major Habitat Limiting Factors	53%	75%	59%

Puget Sound Chinook ESU



Ozette Lake Sockeye ESU



Hood Canal Summer Chum ESU

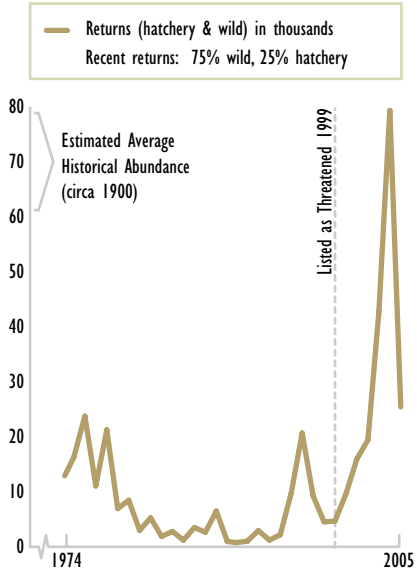
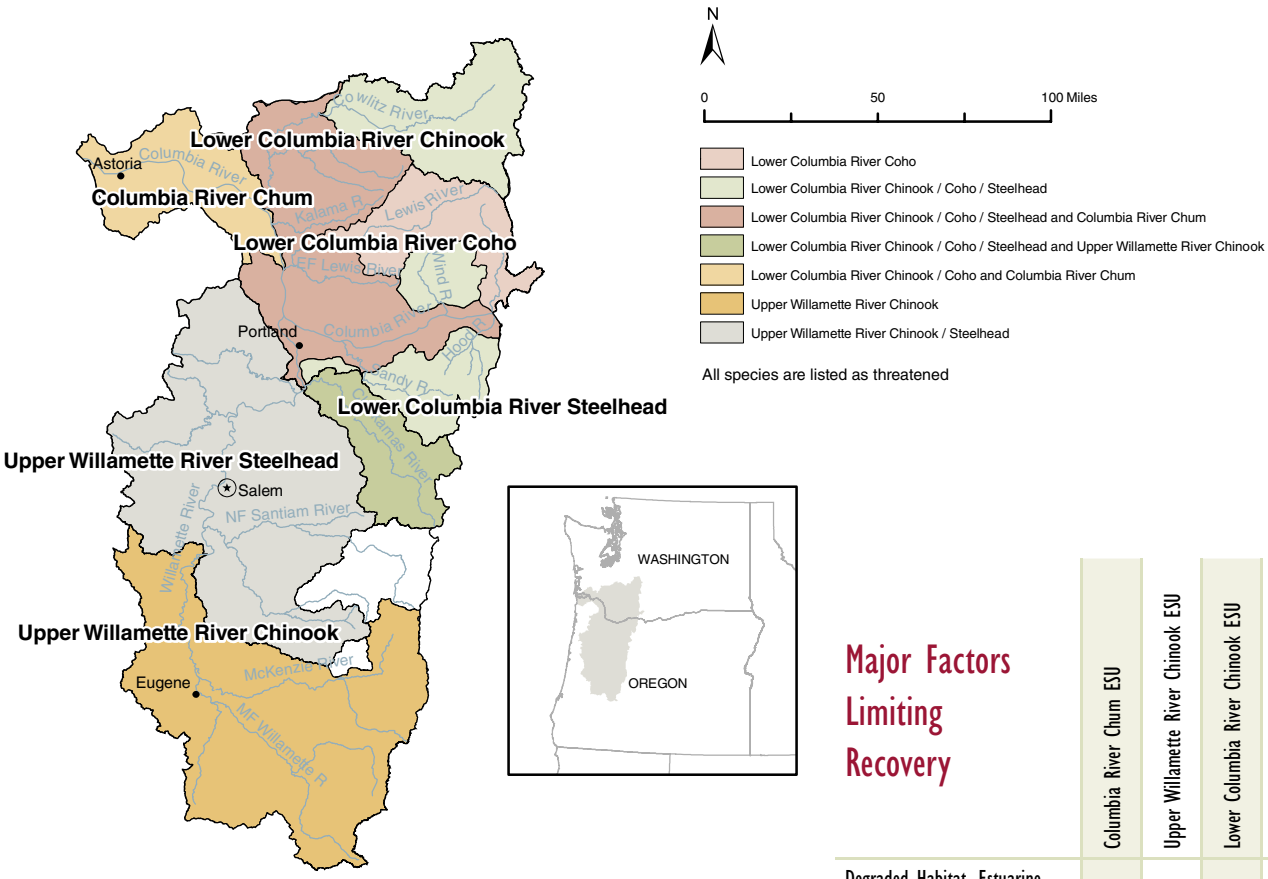


Exhibit 3-3: Willamette/Lower Columbia Recovery Domain



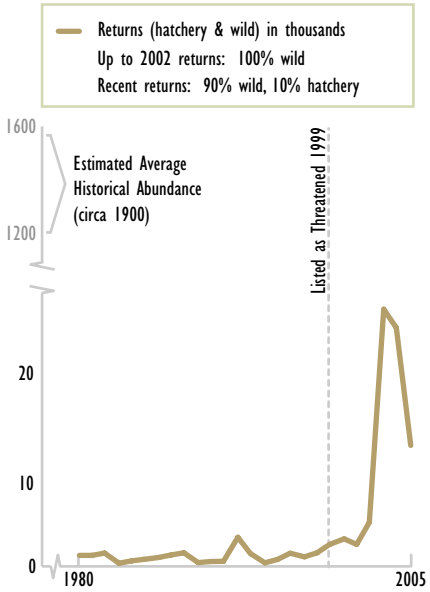
PCSRF Activities in the Recovery Domain

- Restored 79 stream miles and stabilized 4 stream miles of instream habitat
- Restored 1,491 acres of upland habitat and reduced impacts from 1 mile of road
- Restored 1,339 acres and 460 stream miles of riparian habitat
- Restored 2,405 acres and created 35 acres of wetland habitat
- Restored 504 acres and created 414 acres of estuarine habitat
- Protected 2,223 acres and 28 stream miles of habitat through land acquisition, easement, or lease
- Treated 827 acres of riparian habitat for invasive species
- Treated 59 acres of wetland habitat for invasive species
- Removed 165 barriers to fish passage, opening 494 stream miles

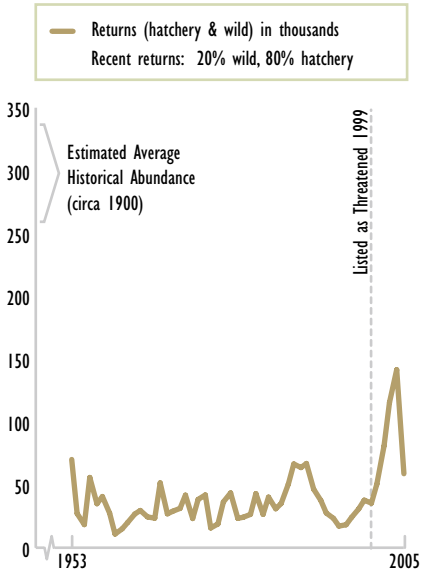
Major Factors Limiting Recovery

Major Factors Limiting Recovery	Columbia River Chum ESU	Upper Willamette River Chinook ESU	Lower Columbia River Chinook ESU	Lower Columbia River Steelhead DPS	Upper Willamette River Steelhead DPS	Lower Columbia River Coho ESU
Degraded Habitat–Estuarine and Nearshore Marine	●		●			
Degraded Habitat–Floodplain Connectivity and Function	●	●	●	●	●	●
Degraded Habitat–Channel Structure and Complexity	●	●	●	●	●	●
Degraded Habitat–Riparian Areas and Large Woody Debris Recruitment	●	●	●	●	●	●
Degraded Habitat–Stream Substrate	●		●	●		●
Degraded Habitat–Stream Flow	●		●	●	●	●
Degraded Habitat–Water Quality		●		●		●
Degraded Habitat–Fish Passage	●	●	●	●	●	
Hatchery-related Adverse Effects		●	●			●
Harvest-related Adverse Effects			●			●
Predation/Competition/Disease				●		
Mainstem Columbia River Hydropower-related Adverse Effects						
PCSRF Projects Addressing Major Habitat Limiting Factors	71%	76%	72%	71%	63%	55%

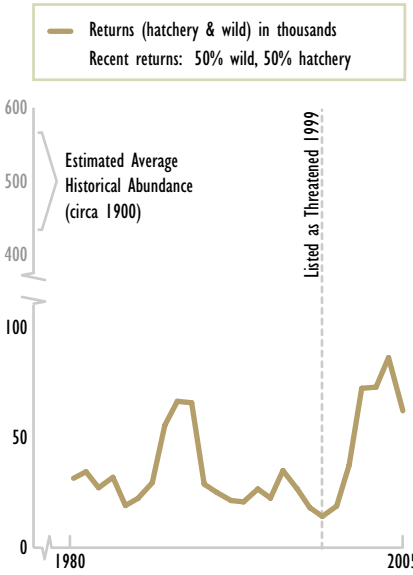
Columbia River Chum ESU



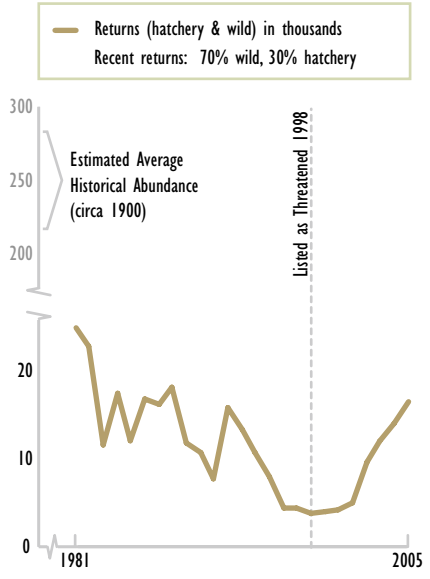
Upper Willamette River Chinook ESU



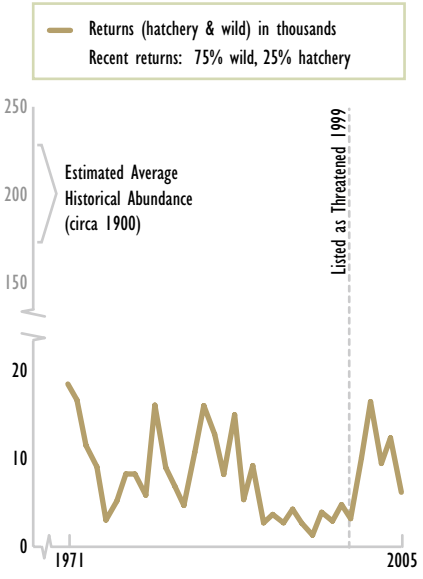
Lower Columbia River Chinook ESU



Lower Columbia River Steelhead DPS



Upper Willamette River Steelhead DPS



Lower Columbia River Coho ESU

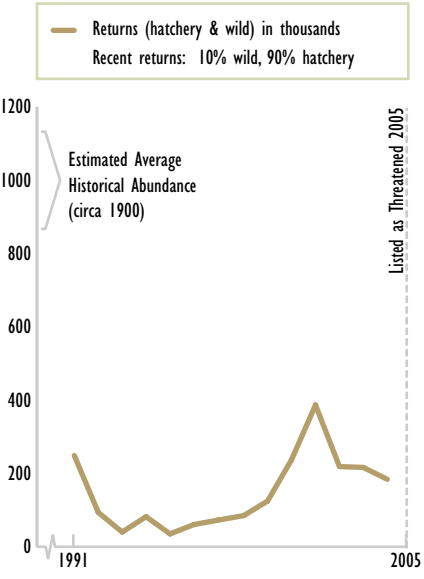
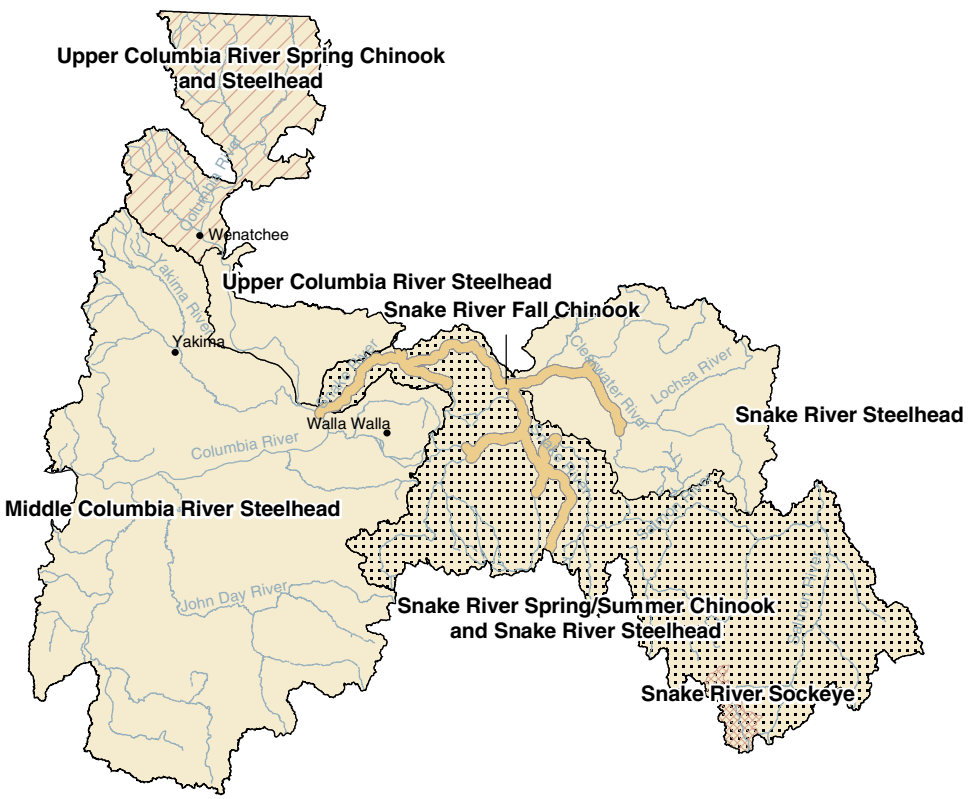
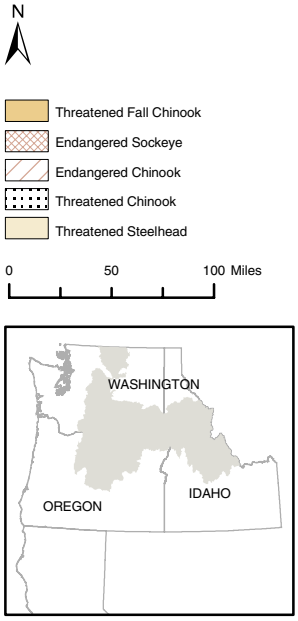


Exhibit 3-4: Interior Columbia Recovery Domain





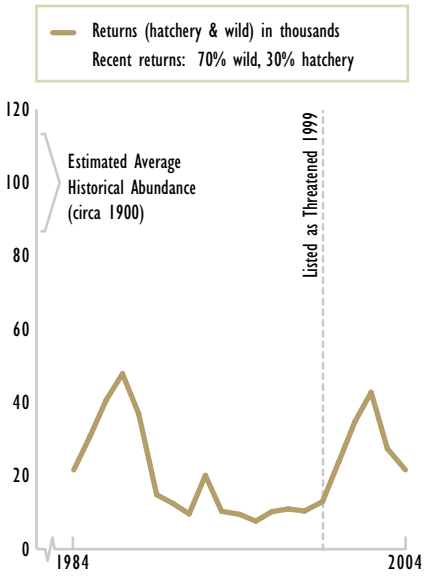
PCSRF Activities in the Recovery Domain

- Restored 130 stream miles and stabilized 17 stream miles of instream habitat
- Restored 87,165 acres of upland habitat and reduced impacts from 132 miles of road
- Restored 3,395 acres and 577 stream miles of riparian habitat
- Restored 1,049 acres of wetland habitat
- Protected 47,669 acres and 192 stream miles of habitat through land acquisition, easement, or lease
- Treated 696 acres of riparian habitat for invasive species
- Removed 196 barriers to fish passage, opening 1,601 stream miles
- Returned 719 cubic feet per second of water for instream flow
- Installed 467 fish screens

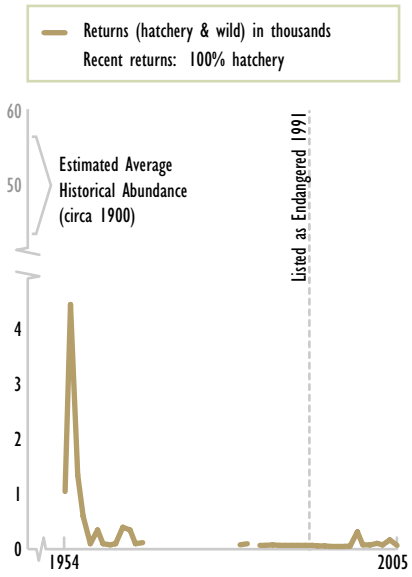
Major Factors Limiting Recovery

	Middle Columbia River Steelhead DPS	Snake River Fall Chinook ESU	Upper Columbia River Spring Chinook ESU	Snake River Sockeye ESU	Snake River Spring/Summer Chinook ESU	Snake River Steelhead DPS	Upper Columbia River Steelhead DPS
Degraded Habitat–Estuarine and Nearshore Marine			●				
Degraded Habitat–Floodplain Connectivity and Function	●	●	●		●	●	●
Degraded Habitat–Channel Structure and Complexity		●	●		●	●	●
Degraded Habitat–Riparian Areas and Large Woody Debris Recruitment	●		●		●	●	
Degraded Habitat–Stream Substrate	●		●		●	●	●
Degraded Habitat–Stream Flow	●		●		●	●	●
Degraded Habitat–Water Quality	●				●	●	
Degraded Habitat–Fish Passage	●					●	●
Hatchery-related Adverse Effects			●				●
Harvest-related Adverse Effects		●					
Predation/Competition/Disease	●					●	●
Mainstem Columbia River Hydropower-related Adverse Effects	●	●	●	●	●	●	●
PCSRF Projects Addressing Major Habitat Limiting Factors	74%	67%	45%	0%	74%	76%	45%

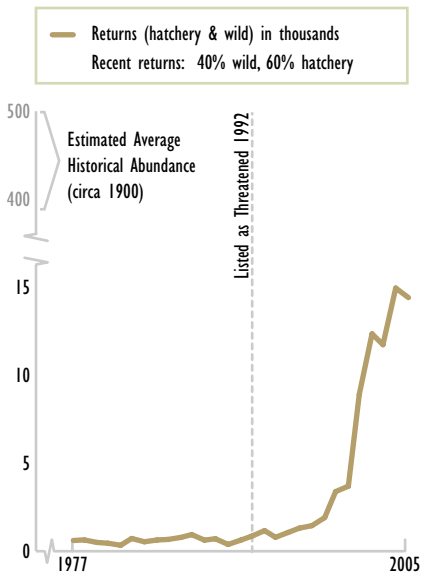
Middle Columbia River Steelhead DPS



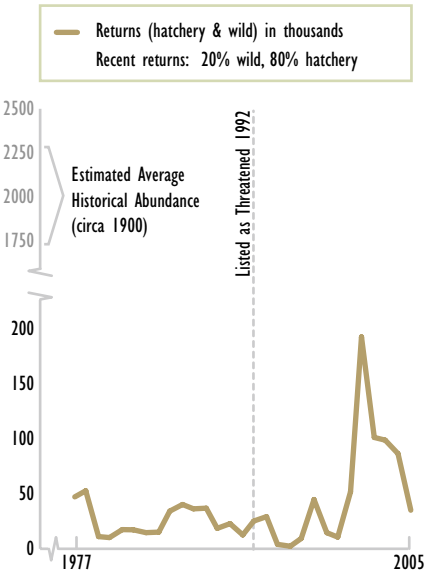
Snake River Sockeye ESU



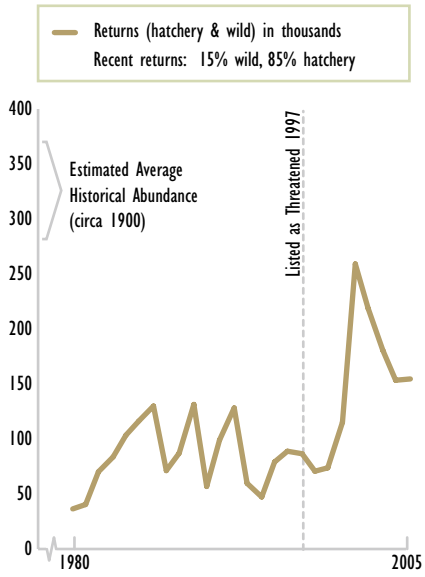
Snake River Fall Chinook ESU



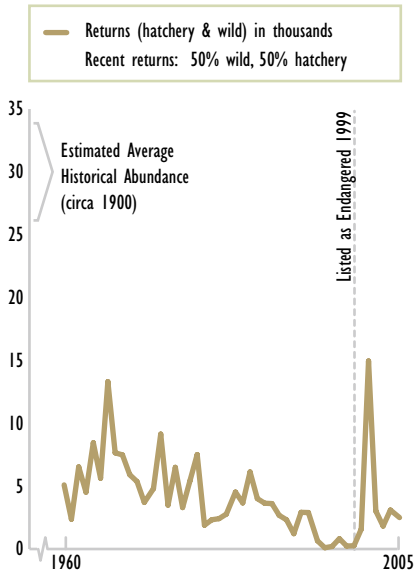
Snake River Spring/Summer Chinook ESU



Snake River Steelhead DPS



Upper Columbia River Spring Chinook ESU



Upper Columbia River Steelhead DPS

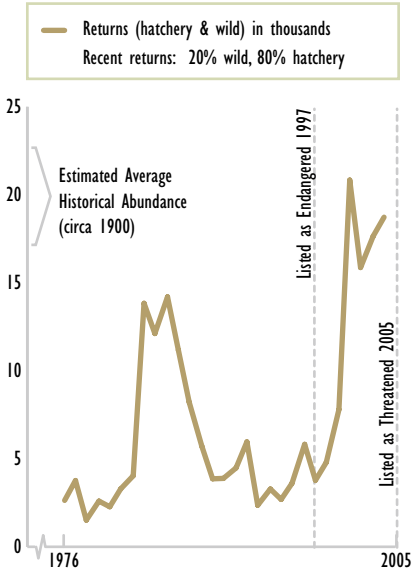
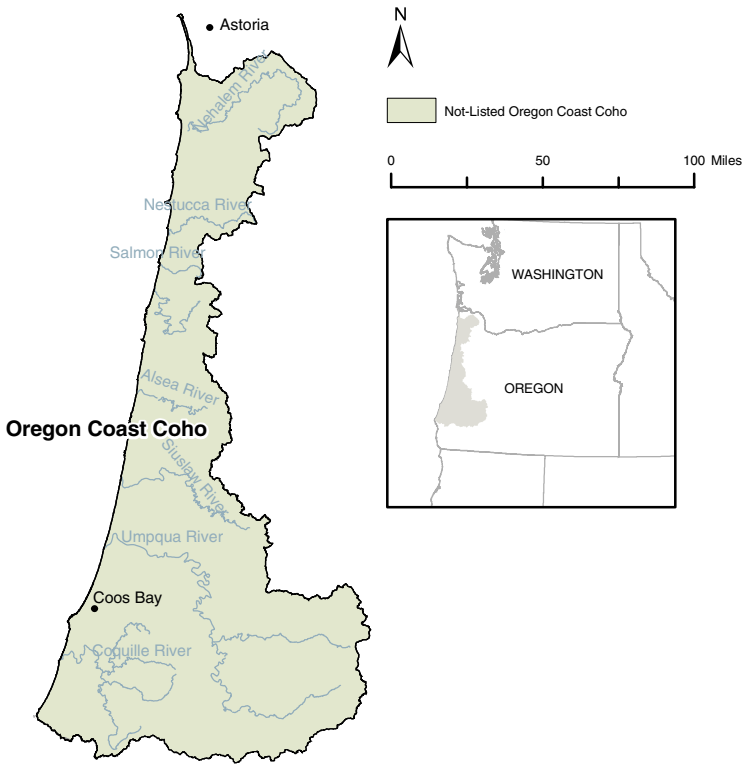
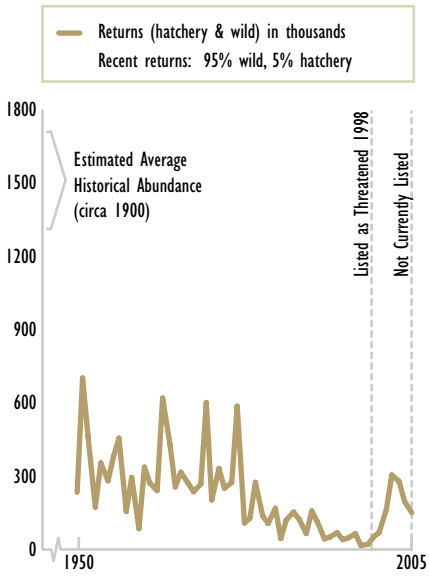


Exhibit 3-5: Oregon Coast Restoration Area*



Oregon Coast Coho ESU



PCSRF Activities in the Restoration Area

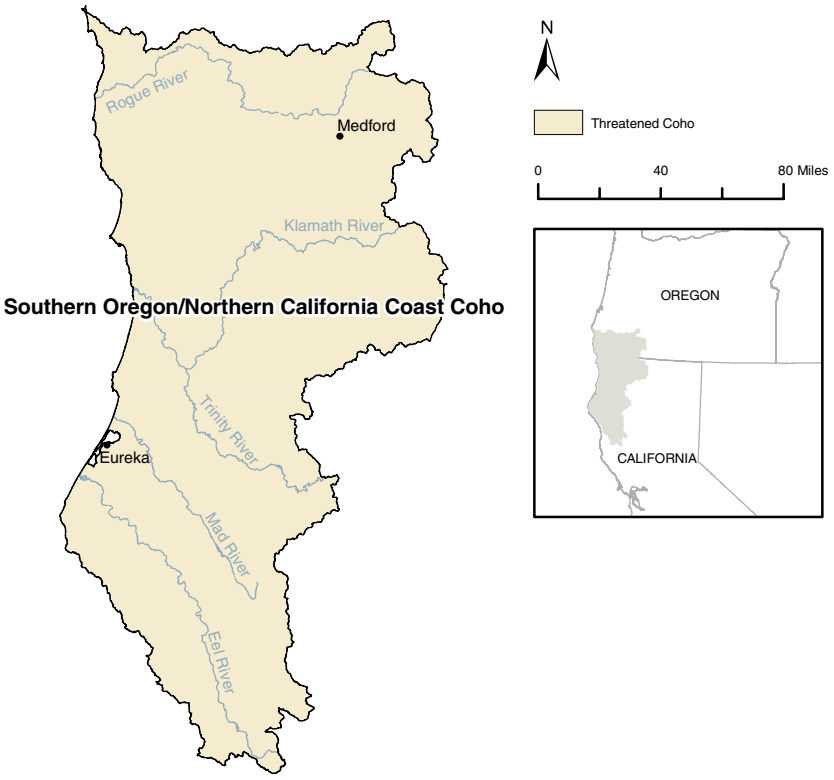
- Restored 212 stream miles of instream habitat
- Restored 192 acres of upland habitat and reduced impacts from 72 miles of road
- Restored 1,239 acres and 477 stream miles of riparian habitat
- Restored 54 acres and created 3 acres of wetland habitat
- Restored 17 acres of estuarine habitat
- Protected 1,114 acres and 8 stream miles of habitat through land acquisition, easement, or lease
- Treated 12 acres of wetland habitat for invasive species
- Removed 408 barriers to fish passage, opening 392 stream miles
- Installed 15 fish screens

Major Habitat Factors

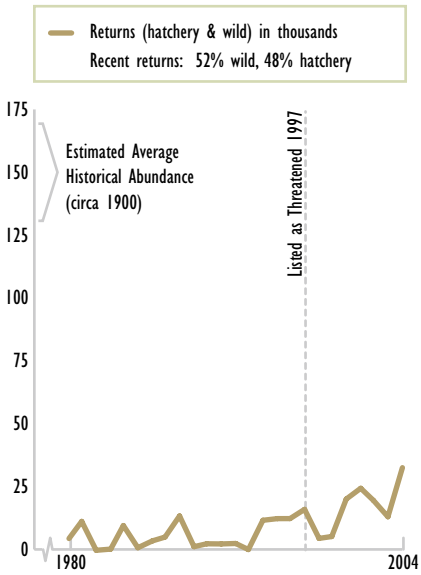
Major Habitat Factors	Oregon Coast Coho ESU
Degraded Habitat–Estuarine and Nearshore Marine	
Degraded Habitat–Floodplain Connectivity and Function	●
Degraded Habitat–Channel Structure and Complexity	●
Degraded Habitat–Riparian Areas and Large Woody Debris Recruitment	●
Degraded Habitat–Stream Substrate	●
Degraded Habitat–Stream Flow	
Degraded Habitat–Water Quality	●
Degraded Habitat–Fish Passage	
Hatchery-related Adverse Effects	
Harvest-related Adverse Effects	
Predation/Competition/Disease	●
PCSRF Projects Addressing Major Habitat Factors	68%

* Previously designated a recovery domain when Oregon coast coho were listed.

Exhibit 3-6: Southern Oregon/Northern California Coast Recovery Domain



Southern Oregon/Northern California Coast Coho ESU*



* Note: The line graph represents the Rogue River basin, providing information for only a portion of the ESU.

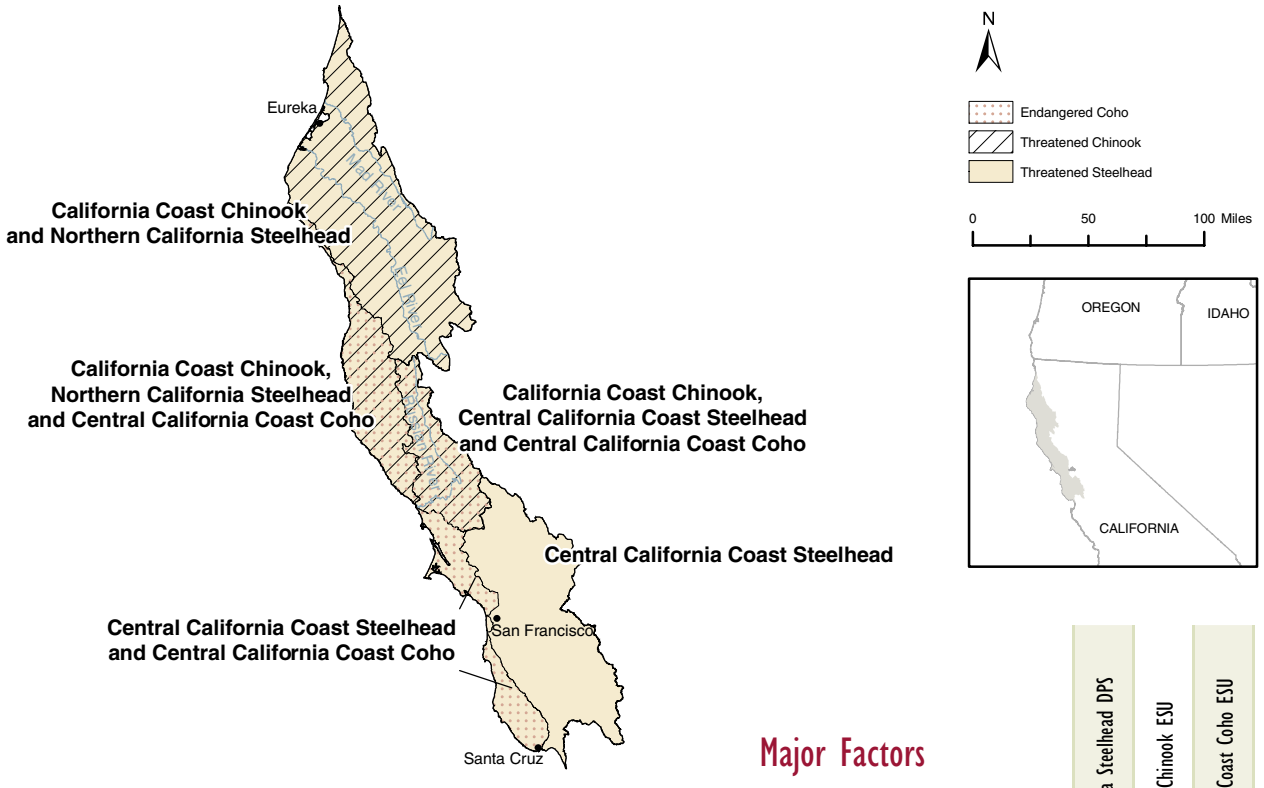
PCSRF Activities in the Recovery Domain

- Restored 242 stream miles and stabilized 31 stream miles of instream habitat
- Restored 1,081 acres of upland habitat and reduced impacts from 896 miles of road
- Restored 733 acres and 195 stream miles of riparian habitat
- Restored 9 acres and created 2 acres of wetland habitat
- Protected 25,260 acres and 2 stream miles of habitat through land acquisition, easement, or lease
- Treated 29 acres of riparian habitat for invasive species
- Removed 457 barriers to fish passage, opening 281 stream miles
- Returned 41 cubic feet per second of water for instream flow
- Installed 78 fish screens

Major Factors Limiting Recovery

	Southern Oregon/Northern California Coast Coho ESU
Degraded Habitat–Estuarine and Nearshore Marine	●
Degraded Habitat–Floodplain Connectivity and Function	●
Degraded Habitat–Channel Structure and Complexity	●
Degraded Habitat–Riparian Areas and Large Woody Debris Recruitment	●
Degraded Habitat–Stream Substrate	●
Degraded Habitat–Stream Flow	●
Degraded Habitat–Water Quality	●
Degraded Habitat–Fish Passage	●
Hatchery-related Adverse Effects	●
Harvest-related Adverse Effects	
Predation/Competition/Disease	●
PCSRF Projects Addressing Major Habitat Limiting Factors	89%

Exhibit 3-7: North-Central California Coast Recovery Domain



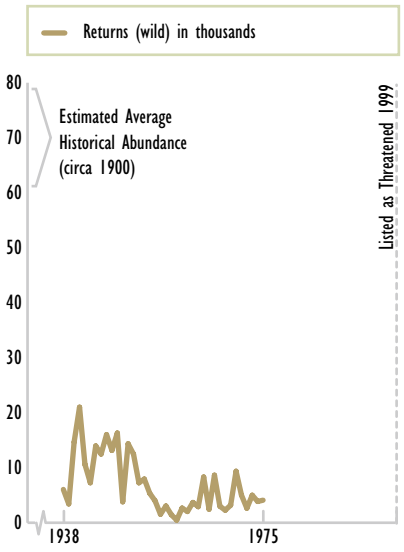
PCSRF Activities in the Recovery Domain

- Restored 269 stream miles and stabilized 9 stream miles of instream habitat
- Restored 7 acres of upland habitat and reduced impacts from 396 miles of road
- Restored 7 acres and 30 stream miles of riparian habitat
- Removed 125 barriers to fish passage, opening 205 stream miles

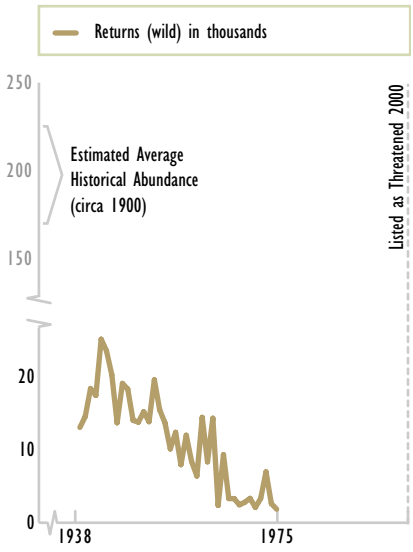
Major Factors Limiting Recovery

	Northern California Steelhead DPS	California Coastal Chinook ESU	Central California Coast Coho ESU	Central California Coast Steelhead DPS
Degraded Habitat–Estuarine and Nearshore Marine	●	●	●	●
Degraded Habitat–Floodplain Connectivity and Function	●	●	●	●
Degraded Habitat–Channel Structure and Complexity	●	●	●	●
Degraded Habitat–Riparian Areas and Large Woody Debris Recruitment	●	●	●	●
Degraded Habitat–Stream Substrate	●	●	●	●
Degraded Habitat–Stream Flow		●	●	●
Degraded Habitat–Water Quality	●	●		●
Degraded Habitat–Fish Passage			●	●
Hatchery-related Adverse Effects				
Harvest-related Adverse Effects				
Predation/Competition/Disease	●	●		
PCSRF Projects Addressing Major Habitat Limiting Factors	89%	89%	87%	87%

California Coastal Chinook ESU*



Northern California Steelhead DPS*



Central California Coast Steelhead DPS

No abundance time series data are available.

- Listed as Threatened 1997
- Historical estimate: 94,000
- Current estimate: 14,100

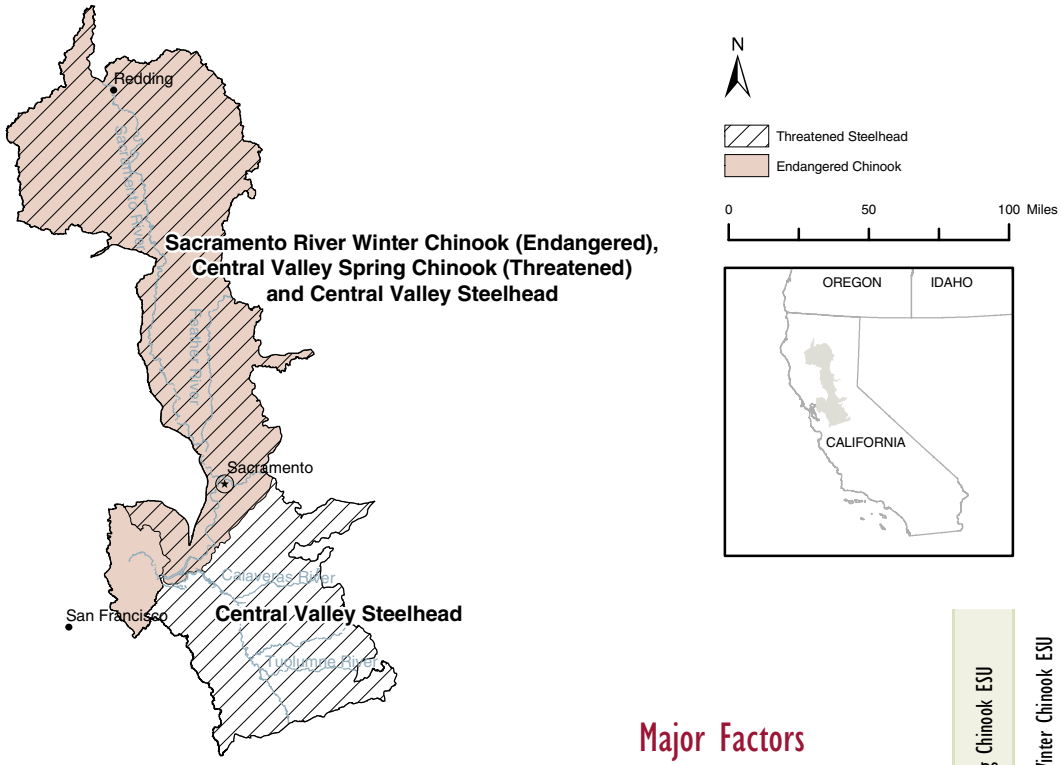
Central California Coast Coho ESU

No abundance time series data are available.

- Listed as Threatened 1996
- Status changed to Endangered 2005
- Historical estimate: 56,100
- Current estimate: 6,160

* Data from dam counts on the South Fork Eel River from 1938–1975 represent the best available for the California Coast Chinook ESU and the Northern California Steelhead DPS and are shown here. There are no abundance time series data available after 1975.

Exhibit 3-8: Central Valley Recovery Domain*



Activities in the Recovery Domain

- Increased water releases from dams
- Improved water quality and water supply through cooperative efforts by CALFED Bay-Delta Program[3]
- Modified dams to improve habitat, temperature, and flow
- Screened water diversions
- Enhanced efforts to reduce illegal harvest
- Planned Battle Creek dam removal program
- Improved stream flows

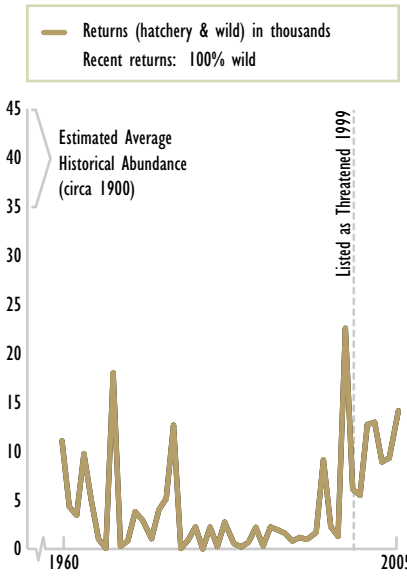
[3] The CALFED Bay-Delta Program is a collaboration among 25 state and federal agencies working together to improve water supplies in California and the health of the San Francisco Bay/Sacramento-San Joaquin River Delta.

Major Factors Limiting Recovery

	Central Valley Spring Chinook ESU	Sacramento River Winter Chinook ESU	Central Valley Steelhead DPS
Degraded Habitat–Estuarine and Nearshore Marine			
Degraded Habitat–Floodplain Connectivity and Function			
Degraded Habitat–Channel Structure and Complexity	●	●	●
Degraded Habitat–Riparian Areas and Large Woody Debris Recruitment	●		
Degraded Habitat–Stream Substrate	●		●
Degraded Habitat–Stream Flow	●	●	●
Degraded Habitat–Water Quality	●	●	●
Degraded Habitat–Fish Passage	●	●	●
Hatchery-related Adverse Effects		●	
Harvest-related Adverse Effects		●	
Predation/Competition/Disease		●	
PCSRF Projects Addressing Major Habitat Limiting Factors	*	*	*

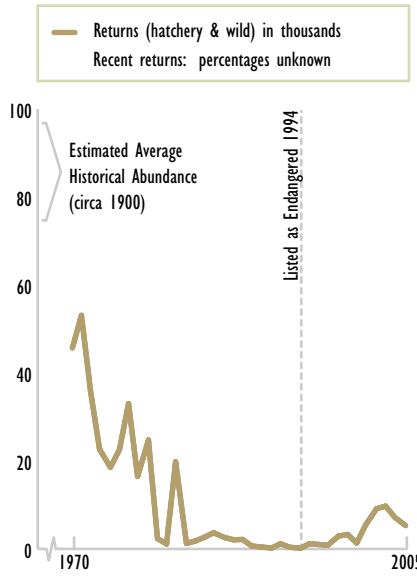
* PCSRF funds were not allocated to projects in this recovery domain.

Central Valley Spring Chinook ESU



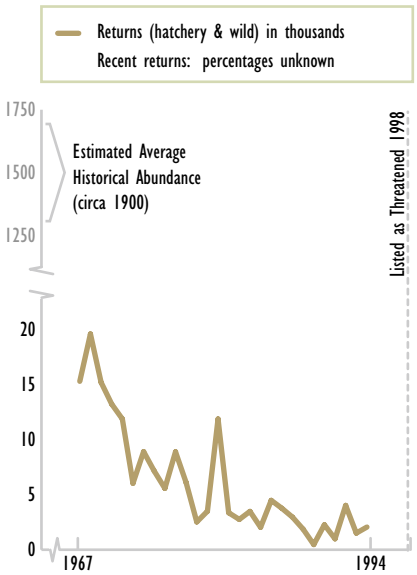
Note: For the purpose of data continuity between years, carcass counts officially recognized by tribes and state and federal agencies are not included in the abundance figures.

Sacramento River Winter Chinook ESU



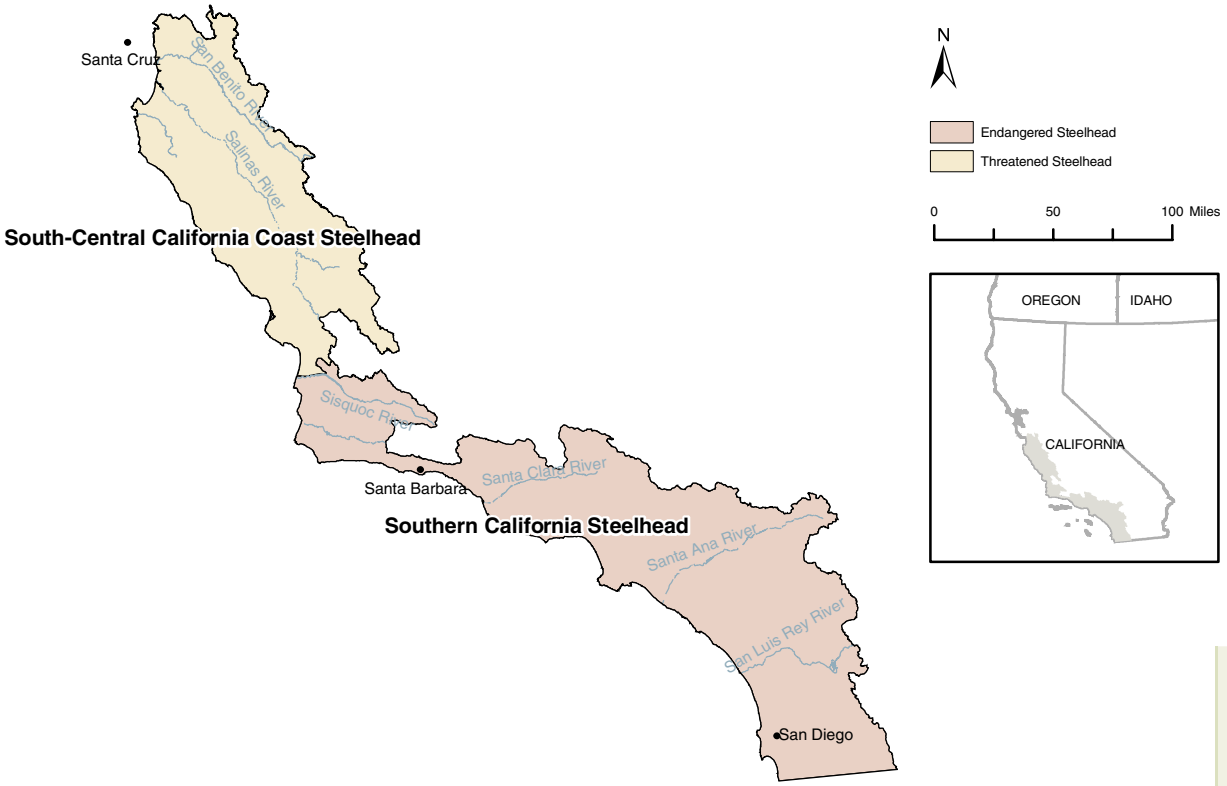
Note: For the purpose of data continuity between years, carcass counts officially recognized by tribes and state and federal agencies are not included in the abundance figures.

Central Valley Steelhead DPS



Note: The data set represents dam counts from 1967–1994 at the Red Bluff Diversion Dam fish ladders, providing information on only a representative portion of the DPS.

Exhibit 3-9: South-Central/Southern California Coast Recovery Domain



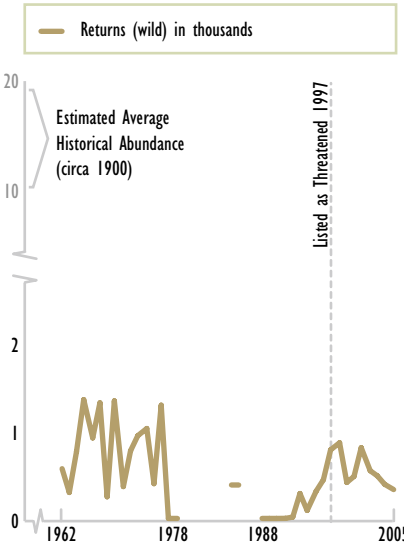
PCSRF Activities in the Recovery Domain

- Restored 114 stream miles and stabilized 2 stream miles of instream habitat
- Reduced impacts from 24 miles of road in upland habitat
- Protected 1,191 acres and 3 stream miles of habitat through land acquisition, easement, or lease
- Removed 45 barriers to fish passage, opening 173 stream miles
- Installed 2 fish screens

Major Factors Limiting Recovery

	South-Central California Coast Steelhead DPS	Southern California Steelhead DPS
Degraded Habitat–Estuarine and Nearshore Marine	●	●
Degraded Habitat–Floodplain Connectivity and Function	●	●
Degraded Habitat–Channel Structure and Complexity	●	●
Degraded Habitat–Riparian Areas and Large Woody Debris Recruitment	●	●
Degraded Habitat–Stream Substrate	●	●
Degraded Habitat–Stream Flow	●	●
Degraded Habitat–Water Quality	●	●
Degraded Habitat–Fish Passage	●	●
Hatchery-related Adverse Effects		
Harvest-related Adverse Effects		
Predation/Competition/Disease	●	●
PCSRF Projects Addressing Major Habitat Limiting Factors	90%	90%

South-Central California Coast Steelhead DPS



Note: The data set represents dam counts at the San Clemente Dam fish ladder on the Carmel River, providing information for only a portion of the ESU. Fish count methodology changed in 1980. No records exist for 1978–83 and 1985–87. It is also estimated that between 10–50% of steelhead spawn below the dam.

Southern California Steelhead DPS

No abundance time series data are available.

- Listed as endangered 1997; range extended 2002
- Historic estimate 32,000–46,000
- Current estimate <100 fish

Recovery Planning

Each recovery domain has a Technical Recovery Team (TRT) charged with providing the technical basis for recovery plans. Recovery plans identify the recovery and restoration actions necessary to address the key factors limiting the species and help to prioritize the implementation of recovery actions. To ensure the development and implementation of recovery plans in the Pacific Coast region, NMFS and the TRTs have worked cooperatively with multiple entities within recovery domains, including government agencies, landowners, and other interested parties involved in salmon recovery.

Watershed assessment and planning projects conducted using the PCSRF and other funds have helped identify the factors limiting recovery and provided a means to determine whether resources for restoration projects are targeted appropriately. As salmon recovery planning progresses, recovery plans will be developed, either through local recovery planning efforts or by NMFS staff in collaboration with stakeholder groups, to meet the requirements of the ESA. These plans will continue to play important roles in progress toward recovery and long-term salmon and steelhead sustainability. The current status of the plans by recovery domain is shown in Exhibit 3-10. Also, as was described in Chapter 2, other monitoring programs are being established to ensure that resources are invested where and when needed to support restoration and recovery of salmon and steelhead populations.

Exhibit 3-10: Status of Recovery Plans by Recovery Domain

ESU/DPS	Technical Recovery Teams		Interim Regional Recovery Plan*	ESA Recovery Plan
	Identification of Independent Populations	Population Viability Guidelines and Recovery Goals		
Puget Sound Recovery Domain				
Puget Sound Chinook	●	●		●
Hood Canal Summer Chum	●	●		●
Ozette Lake Sockeye	●	●		○
Willamette/Lower Columbia Recovery Domain				
Lower Columbia Chinook, Coho, and Steelhead; Columbia Chum*	●	●		○
Washington Lower Columbia Management Unit	●	●	●	
Oregon Lower Columbia Management Unit	●	●	○	
Upper Willamette Chinook and Steelhead	●	●	○	
Interior Columbia Recovery Domain				
Upper Columbia River Steelhead and Spring Chinook	●	●		◑
Middle Columbia River Steelhead*	●	●		○
Eastern Washington Lower Snake Management Unit	●	●	◑	
Washington Yakima River Management Unit	●	●	◑	
Oregon Management Unit	●	●	○	
Washington Columbia Gorge Management Unit	●	●	○	
Snake River Sockeye, Fall and Spring Chinook, and Snake River Basin Steelhead*	●	●		○
Eastern Washington Lower Snake River Management Unit	●	●	◑	
Oregon Snake River Basin Management Unit	●	●	○	
Idaho Snake River Basin Management Unit	●	●	○	
Southern Oregon/Northern California Coast Recovery Domain	●	○		○
North-Central California Coast Recovery Domain	●	○		○
Central Valley Recovery Domain	●	○		○
South-Central/Southern California Coast Recovery Domain	●	○		○

* Interim plans contain all plan elements required by the ESA, but address only a portion of an ESU or DPS. A number of interim regional plans are combined to address the entire ESU or DPS, and this full plan then is proposed and finalized as an ESA recovery plan. (Interim plans are only developed in certain domains, depending on jurisdictional boundaries and local planning efforts.)

● = Completed
◑ = Proposed Plan
○ = Underway